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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/717,068	11/22/2000	In-Jea Chung	8733.329.00	2403

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EXAMINER
SCHECHTER, ANDREW M

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 12/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/717,068	CHUNG ET AL.	
	Examiner	Art Unit	
	Andrew Schechter	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☒ Interview Summary (PTO-413) Paper No(s). *8* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Method of fabricating liquid crystal panel by arranging high viscosity liquid crystal onto a substrate".

Response to Arguments

2. Applicant's arguments filed 16 October 2002 have been fully considered but they are not persuasive.

With the clarification discussed in the Interview Summary of 19 December 2002 that the viscosity change produced by the heat-treating need not be a permanent phase transition, the grounds for the previous rejections under 35 U.S.C. 112 are removed. Heating liquid crystals to lower their viscosity, by a variety of different means, is well-known in the art and one of ordinary skill in the art would be able both to make and use the invention, and also understand the scope of the claims. The previous rejections under 35 U.S.C. 112, first and second paragraphs, are withdrawn.

The amendment to claim 1, reciting the liquid crystal viscosity range, has overcome the previous rejections over *Kato* and *Abe,* which are withdrawn.

Regarding the argument that "it is not possible to make any meaningful comparison between the 'absolute' viscosity of one liquid crystalline substance and the

'kinematic' viscosity value of another liquid crystalline substance" [p. 7]; this argument is not persuasive. The applicants themselves point out that one is defined as the other divided by the mass density, so with knowledge of the mass density of either material, an exact comparison is possible. Even without knowing the precise mass densities involved, it is generally possible to compare the two for liquid crystals: "since many common nematic liquid crystals have densities in the range 0.98 – 1.02 g cm^{-3} at 20°C a distinction between ν [kinematic] and η[absolute] has usually not to be made" [*Pohl et al.*, pp. 161-2]. Thus, 1 cP, 1 mm^2/sec, 1 mPa sec, and 1 cSt are all approximately equal.

Regarding the argument that it would be improper to modify *Omeis* to make a liquid crystal display, this argument is persuasive. The technique of *Omeis* is directed towards making some form of liquid crystal film, such as for an optical compensation layer or data storage device, and there is no suggestion in *Omeis* to use the technique to form a display device. The previous rejections in view of *Omeis* are therefore withdrawn.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3-7, 12, 14, and 15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over *Harada et al.*, U.S. Patent No. 5,361,152.

Harada discloses a fabricating method for a LCD comprising providing two substrates [1, 4], forming orientation films on them [col. 3, lines 1-4], depositing a liquid crystal material [col. 3, line 52 – col. 4, line 1], forming a seal material [2] at the edges of one substrate, attaching the substrates [col. 5, lines 34-35], and heat-treating the liquid crystal material to lower the viscosity [col. 5,lines 40-45]. *Harada* deposits high viscosity ferroelectric liquid crystals and heat-treats them to lower their viscosity to the nematic viscosity range, but does not disclose explicit values of the viscosities of the liquid crystal when it is deposited or when it is being heat-treated to compare to the claimed ranges.

However, *Harada* discloses using ferroelectric liquid crystals (FLC), which *Harada* describes as being much more viscous than nematic liquid crystals [col. 1, lines 30-34]. The examiner also notes, for example, the statement of *Asano* that a "viscosity of a nematic liquid crystal ... is preferably not higher than 30 cp" [col. 7, lines 60-62] and the applicants' statement in the specification [p. 9] that the "conventional liquid crystal has a viscosity of 20 to 50 mm^2/sec". Finally, *Harada* discloses that the heat-treatment heats the liquid crystal to the temperature where it exhibits a nematic phase [col. 5, lines 41-45]. These taken together provide a clear rationale for the examiner to believe that the ferroelectric liquid crystal of *Harada* inherently has a viscosity greater than 100

mm^2/sec when deposited, while the heat-treatment causes the liquid crystal to have the same characteristics as a material have a (nematic) viscosity of 20 to 50 mm^2/sec.

In this situation, when the prior art process seems to be identical to the claimed process, except that the prior art is silent as to an inherent characteristic, a rejection under 35 U.S.C. 102/103 is appropriate. The examiner has presented a rationale tending to show inherency of the property about which the reference is silent; even if it were shown not to be an inherent feature, the claimed invention would still be obvious over *Harada*. One of ordinary skill in the art would be motivated to heat the liquid crystals to reduce the viscosity to the claimed range to achieve the objectives described by *Harada*, and motivated to deposit FLCs having the claimed viscosity range motivated by *Harada's* teaching of their increasing use [col. 1, lines 10-15] coupled with *Harada*'s method of overcoming the problem of their high viscosity [col. 1, lines 30-42]. Claims 1, 5, 6, and 12 are therefore either anticipated or unpatentable over *Harada*.

Harada discloses heat-treating after attaching the substrates, and using a roller or dispenser to print the FLC [col. 3, lines 51-55], so claims 3, 4, 7, 14, and 15 are also unpatentable.

5. Claims 10, 11, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Harada* as applied to claims 1 and 12 above, and further in view of *Kim et al.*, U.S. Patent No. 5,742,370.

Harada does not disclose spin-coating the FLC on, but this is an art-recognized equivalent to the other methods *Harada* does disclose, as evidenced by *Kim* which discloses liquid crystal "coated by spin-casting, roll coating, or spray coating method"

[col. 3, lines 55-57]. One of ordinary skill in the art would find it obvious to use spin-coating with a rotating substrate, since it is equivalent to the disclosed method. Claims 10, 11, 18, and 19 are therefore unpatentable.

6. Claims 8, 9, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Harada* as applied to claims 7 and 15 above, and further in view of *Abe,* U.S. Patent No. 5,511,591.

Harada does not disclose the details of how the dispenser works; *Abe* discloses a dispenser which repeatedly moves over the substrate in a preset manner while dispensing liquid crystal, presumably controlled by a preset program. [If not, such automation would be obvious to do. Also, in *Abe* the substrate moves and the dispenser is fixed; the relative motion is the same, however.] It would be obvious to one of ordinary skill in the art to use *Abe's* dispenser with the process of *Harada*, motivated by *Abe*'s teaching that using it "can contribute greatly to productivity improvement because the time for filling is so much reduced" [col. 9, lines 14-17]. Claims 8, 9, 16, and 17 are therefore unpatentable.

7. Claims 2, 13, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Harada* as applied to claims 7 and 15 above, and further in view of *Asano,* U.S. Patent No. 4,974,940.

Harada does not explicitly disclose rubbing the orientation films, though this is so conventional one of ordinary skill in the art would likely take it to be inherent in the device of *Harada*. Regardless, *Asano* does disclose rubbing the orientation films, and one of ordinary skill in the art would be motivated to do so in the device of *Harada* by

Asano's teaching that "a rubbing method which is excellent for mass production can effectively be used" [col. 10, lines 3-5]. Claims 2, 13, and 20 are therefore unpatentable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (703) 306-5801. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-4711 for regular communications and (703) 746-4711 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Andrew Schechter
December 20, 2002

[illegible] EXAMINER
[illegible] 2800